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A MONOGRAPH OF THE GENUS SYNERGUS Hartig.

BY C. P. GILLETTE.

I find in the college collection, as a result of our rearings for the past three years, a considerable number of *Synergus* species, some of which are new to science. As I have the original descriptions and also representatives of all the North American species, and as many of the descriptions are inaccessible to students of Entomology, I have concluded to bring together, in one paper, descriptions of all the species, with an epitome of our present knowledge in regard to their habits.

In this connection I wish to thank Mr. W. H. Ashmead who has, in past years, determined several species of *Synergus* for me, and who has sent me types of those species described by himself.

The members of this genus are all Inquilines, or guest-flies, inhabiting the galls of the oak-infesting Cynipidæ. Although true parasites, so far as the gall within which they develop is concerned, they are not parasites in the ordinary acceptance of that term as applied to insects, as they do not attack the true gall producer. They are vegetable feeders and not flesh consumers.

This genus is not a large one as at present known in this country. In Europe there are 31 described species of *Synergus*, while, including the eight new species in this paper, there have been but 24 species described from North America. As yet none of these 55 species are known to occur on both sides of the Atlantic.

The bibliography given in this paper is largely copied from Dr. De Dalla Torre's "Catalogus Hymenopterorum."

SYNERGUS.

Hartig, Zeitschr. f. Entom. ii, 1840, p. 186, n. 13.

This genus is readily separated from all other Hymenoptera by the closed marginal cell of the wing, the coarsely striated face, the fluted petiole and first abdominal segment, and by the large second abdominal segment, which occupies nearly or quite all of the abdomen.

The species may all be separated into three natural groups as follows :

- Antennæ of female 13-jointed.....Group I.
- Antennæ of female 14-jointed.....Group II.
- Antennæ of female 15-jointed.....Group III.

Group I (Antennæ of female 13-jointed).

The females of this group may be separated as follows :

A. Thorax entirely black.

B. Abdomen not distinctly longer than broad.....**atra** n. sp.

BB. Abdomen distinctly longer than broad.....**dimorphus** O. S.

AA. Thorax and head almost entirely rufous.....**bicolor** Ash.

AAA. Thorax above black.

B. Mesonotum with long, transverse wrinkles, which are very distinct, somewhat shining.....**dimorphus** O. S.

BB. Mesonotum indistinctly transversely wrinkled and opaque.

C. Antennæ not reaching the scutellum.....**medullæ** Ash.

CC. Antennæ reaching the scutellum.....**lignicola** O. S.

Synergus atra n. sp.

Female.—Color black, with face beneath the eyes, antennæ and legs somewhat yellowish. Head sharply and finely striated beneath the antennæ, vertex and occiput microscopically sculptured and with scattered, broad punctures; antennæ 13-jointed, the last joint once and a half the length of the preceding and conspicuously black, third joint once and a half the length of the fourth; color, except the last joint, yellow; would reach to about the middle of the abdomen. Thorax deep black, opaque, pronotum rather coarsely transversely rugose, especially posteriorly, parapsidal grooves distinct, nearly parallel, foveæ of scutellum small, but shining, disc of scutellum coarsely rugose, collar coarsely rugoso-punctate, mesopleuræ entirely aciculated. Abdomen black, as broad as long, ventral valve projecting, sides of second segment not punctured posteriorly. Legs with tibiæ and tarsi of two anterior pairs yellowish, remaining portions, except at the joints, blackish. Wings with marginal cell closed, areolet very small and indistinct, tegulæ dark brown. Length 2 mm.

Male.—Differs from the female by having a smaller abdomen, and in having the antennæ 14-jointed, with the third joint excised and fully as long as the two following together.

Described from four females and three males bred from unknown galls by the writer, at Lansing, Mich., and two females bred from galls of *Holcaspis rubens* Gill. taken at Manitou, Colorado.

Without close examination this species would be taken for small individuals of *Synergus campanula* O. S., but it is readily separated from that species by the coarser sculpturing of the mesonotum, the 13-jointed antennæ of the female, and the much longer third joint as compared with the fourth.

Synergus dimorphus O. S.

Synergus dimorphus O. S., Proc. Ent. Soc. Phila. iv, 1865, p. 376, n. 5, ♀ ♂.

Synergus dimorphus Cresson, Synop. Hym. Amer., 1887, p. 180.

Synergus dimorphus De Dalle Torre, Cat. Hym. ii, 1893, p. 110.

Female.—0.12–0.13 long. Head black, except the face, which is brownish red mixed with black, below the antennæ; mandibles (except their tip, which is black) and more or less space near their roots on cheeks, yellowish; the brownish coloring of the face extends above the antennæ in the shape of a narrow stripe

along the eyes; vertex black, moderately shining, with sparse, broad, flat-bottomed punctures. Antennæ brownish yellow, 13-jointed, about three-fourths the length of the body; the fourth joint is a little longer than one-half of the third; joints four, five and six are nearly of the same length; the following joints are somewhat shorter; the last joint is about equal to the two preceding taken together. Thorax black, moderately shining, with very rough, but not very dense transverse rugosities; pubescence short and very sparse; parapsidal grooves well marked, punctured at the bottom; scutellum coarsely sculptured: its basal foveæ are indistinct; the smooth space of the pleuræ is almost entirely aciculate; scapulæ brownish yellow. First segment of the abdomen longitudinally striate; the second segment concealing all the following, has the shape of an elongated oval when seen from above; seen from the side its longitudinal diameter distinctly exceeds the transverse one; the ventral valve, ending in a short, pubescent point, usually projects beyond the edge of the second segment, its angle is about 60° or 70° ; abdomen polished, black; ventral valve yellowish brown; feet brownish yellow; hind tibiæ and a part of the first joint of the hind tarsi infuscated; tips of all the tarsi brownish; veins of the wings brownish; areolet rather small, its structure like that of the following species (*S. campanula*).

"*Male*.—0.10 long; antennæ 15-jointed, third joint excised below, fourth half as long as the third; head yellow, except a black spot on the vertex, which includes the ocelli; a part of the collare and of the pleuræ also yellow, which color seems to be variable in extent in different specimens; abdomen truncate at the tip, bell-shaped when seen from the side; the sculpture of the head and thorax and the coloring of the feet are the same as in the female."

Baron Osten Sacken did not know the galls from which he obtained his specimens. The specimens in my collection I bred from woody twig galls taken at Lansing, Mich., on red oak and no true gall-flies were reared. The flies issued in large numbers and vary much in color, especially in the females. The females also vary from one and a half to three mm. in length. The darkest of these show a slight rufous coloration only on the lower portion of the face, about the eyes and a small spot in front of the tegulæ; light ones have the whole head, except a dark spot on the vertex, the neck, and a large space on the shoulders, bright rufous as in the males.

This species is quite close to *lignicola* O. S., but differs from that species in having a very coarsely transversely wrinkled mesonotum.

Synergus bicolor Ash.

Synergus bicolor Ash., Trans. Am. Ent. Soc. xii, 1885, p. 302, ♀ ♂.

Synergus bicolor Cresson, Synop. Hymen. Amer. 1887, p. 180.

Synergus bicolor De Dalle Torre, Cat. Hymen. ii, 1893, p. 110.

"Length .12-.14 inch. Head, thorax, antennæ and legs yellowish; thorax and legs finely rugoso-punctate; a small brown blotch on vertex of head and a medial stripe on mesoscutum and along the hinder edges; antennæ 15-jointed in male, 13-jointed in female; abdomen polished black; wings hyaline, veins yellowish."

Mr. Ashmead's specimens were bred from the galls of *Andricus foliatus* Ash.

From two types, both males, which Mr. Ashmead has loaned me, I will add the following to the description :

Second abdominal segment entirely without punctures on the side ; first, second and third antennal joints conspicuously larger in diameter than those immediately following them, the second joint as long as the fourth, the third joint nearly as long as the fourth and fifth together. The mesonotum is what I have termed coarsely transversely rugose in my descriptions.

Synergus lignicola (O. S.)

Cynips (*Synergus* ?) *lignicola* O. S. Proc. Ent. Soc. Phila. i, 1862, p. 252, ♀ ♂.

Synergus rhoditiformis Walsh, Proc. Ent. Soc. Phila. ii, 1864, p. 499, n. 22, ♀ ♂.

Synergus lignicola O. S., Proc. Ent. Soc. Phila. iv, 1865, p. 374, n. 2. ♀.

Synergus rhoditiformis Provancher, Nat. Canad. xiv. 1883, pp. 20 and 807, ♀.

Synergus lignicola Provancher, Aditt. faun. Canad. Hymen. 1887, p. 165, n. 1.

Synergus lignicola Cresson, Syn. Hymen. Amer. 1887, p. 180.

Synergus lignicola De Dalla Torre, Cat. Hymen. ii, 1893, p. 112.

"*Female*.—Black. Head with the space behind the eyes (but not the occiput) and also the face below the origin of the antennæ and the mouth, dull yellowish brown varying from dark to pale, the vertex glabrous and moderately polished, the rest of the head opaque and the face finely pubescent. Antennæ nearly as long as the body, 14-jointed, with the last joint scarcely longer than the penultimate, yellowish brown with the two basal joints blackish. Thorax with the collare very finely rugose, the mesonotum before the scutel with coarser transverse waving striæ or rugosities, and with two acute longitudinal striæ converging on the scutel, between the base of which striæ is a shallow, but widely impressed, stria. Scutel rugose, with the two basal foveæ subobsolete; under the wings a small, but highly polished round spot. Abdomen highly polished; the joints succeeding the second concealed by it; the second joint, dorsally, describing a circular arc of thirty degrees. Ventral valve moderate, thin, brownish subhyaline, its tip unarmed and in an angle of forty-five degrees. Sheaths extending a little below or a little above the line of the back, with the ovipositor generally protruding between them. Legs dull pale brown, or brown-black, the trochanters, the knees and the tarsi, except their tips, honey-yellow or dull rufous, each successive pair of legs a little darker than the preceding. Wings hyaline; veins rather fine, the principal ones slightly tinged with brown, the cubitus hyaline and indistinct; areolet moderate, its two basal sides hyaline; radial area about two and a half times as long as wide, distinctly closed by a brownish vein, the areolet placed scarcely more than one-fourth of the way from its basal end. Length of female .08-.10 inch.; male unknown."

From Walsh's description of *rhoditiformis*, which he acknowledged to be only a dark form of *lignicola*, we learn that the antennæ in the male is 15-jointed, and that the last joint in the female antenna is once and a half the preceding, and also that the mesonotum in dark specimens may be entirely black.

Osten Sacken, in his synopsis of the species of *Synergus* in volume iv, of the "Proceedings of the Entomological Society of Philadelphia," p. 373, says that the fourth joint of the female antenna is but little more than one-half the length of the third.

Mr. Walsh's specimens were bred from the galls of *Andricus podagræ* Walsh, and Baron Osten Sacken's from the galls of *Andricus cornigera* O. S.

Synergus medullæ Ash.

Synergus medullæ Ash., Trans. Am. Ent. Soc. xii, 1885, p. 302, ♀ ♂.

Synergus medullæ Cresson. Synop. Amer. Hymen. 1887, p. 180.

Synergus medullæ De Dalle Torre, Cat. Hym. ii, 1893, p. 112.

"Length .07-.16 inch., it varying greatly in size. Head and thorax coarsely rugoso-punctate; antennæ 15-jointed in female, 15-jointed in male, they with the head and sides of the collar yellowish; eyes and thorax brown; abdomen black, smooth and shining; wings hyaline, veins yellow."

I have four type specimens of this species sent me by Mr. Ashmead. There is, evidently, a typographical error in the original description, for the three females in my possession all have 13-jointed antennæ. Like other 13-jointed species the third joint is nearly twice the fourth in length. The sides of the second abdominal segment are without punctures.

Specimens of *lignicola* in my possession, which were also sent me by Mr. Ashmead, and which were bred by him from the galls of *Andricus cornigera*, enable me to separate this species from *medullæ* as follows: The parapsidal grooves are much more distinct in *lignicola* than in *medullæ*; in the latter species the antenna is very short, hardly reaching beyond the middle of the mesonotum; in *lignicola* they are decidedly longer, easily reaching the scutellum, and the terminal joint in the female is unusually long, fully as long as the third. In the males, the last joint scarcely, if at all, exceeds the preceding in *medullæ*, while it is nearly twice the penultimate joint in *lignicola*. I also notice in my specimens of female *medullæ* that in no case do the ovipositor sheaths project from the second segment, while in *lignicola* they are considerably protruded and directed upwards.

Group II (Antennæ of female 14-jointed).

- A. One-third or more of the posterior lateral portion of the second abdominal segment microscopically punctured.
- B. Head and abdomen largely yellowish or rufous.
- C. Mesonotum coarsely transversely wrinkled, the wrinkles plainly extending from one parapsidal groove to the other... **oneratus** O. S.
- CC. Mesonotum very finely transversely wrinkled, the rugæ broken between the parapsidal grooves.
- D. Metathorax and pectus black.
- E. Second abdominal segment on tergum, posteriorly, entirely hiding the following segments... **garryana** Gill.
- EE. Second abdominal segment on tergum deeply incised, exposing the following segments.

- F. Antenna hardly attaining middle of abdomen.....**incisus** n. sp.
 FF. Antenna about as long as the body.
 G. Mesopleuræ and antennæ black.....**similis** n. sp.
 GG. Mesopleuræ and antennæ rufous.....**duricoria** n. sp.
 DD. Metathorax and pectus rufous.....**ficigeræ** Ash.
 BB. Head, except vertex, yellowish; abdomen black.....**erinacei** n. sp.
 BBB. Head, except mouth-parts and abdomen, black.....**punctata** n. sp.
 AA. Sides of second abdominal segment not punctured, or with a few punctures near posterior margin only.
 B. Mesonotum coarsely and densely transversely wrinkled.
 C. Third joint of the antenna hardly longer than the 4th.**mendax** Walsh.
 CC. Third joint of antenna one and a half times the fourth.
 D. Sides of collar and mesopleuræ black.
 E. Legs yellow, or slightly infuscated.....**batatoids** Ash.
 EE. Legs, at least the hind pair and all the coxæ, black.**atripes** n. sp.
 DD. Sides of collar and mesopleuræ yellow.....**mexicana** n. sp.
 BB. Mesonotum polished and with a few long, transverse, feebly raised lines.
coniferæ Ash.
 BBB. Mesonotum finely and evenly sculptured, but not distinctly transversely wrinkled.
 C. Abdomen as broad as long, second segment not long and pointed.
 D. Mesonotum opaque, rugoso-punctate.....**campanula** O. S.
 DD. Mesonotum microscopically rugose and moderately shining.
walshii (**albipes** Walsh).
 CC. Second abdominal segment produced, pointed posteriorly, distinctly longer than broad.....**læviventris** O. S.

Synergus oneratus (Harr.).

- Cynips oneratus* Harris, Treat. Ins. Mass. 1841, p. 398.
Cynips oneratus Harris, Treat. Ins. Inj. Veg., second edition, 1852, p. 434.
Cynips oneratus Fitch, Fifth Rept. Ins. N. Y., 1859, p. 810.
Cynips oneratus Harris, Treat. Ins. Inj. Veg., third edition, 1862, p. 548.
Synergus oneratus Walsh, Proc. Ent. Soc. Phila. ii, 1864, p. 498, No. 20.
Synergus oneratus O. S., Proc. Ent. Soc. Phila. iv, 1865, p. 373, n. 1, ♀.
Synergus oneratus Cresson, Syn. Am. Hymen. 1878, p. 180.
Synergus oneratus De Dalla Torre, Cat. Hym. 1893, p. 112.

"The gall-fly of the white oak varies in color. Sometimes it closely resembles the gall-fly of our oak apple, differing from it only in size, and in wanting the brownish spot and dark colored veins on the fore wings; and sometimes it is of a dull brownish yellow color, with a brown spot on the back. It is three-twentieths of an inch long, and its wings expand three-tenths of an inch. It is the *Diplolepis*, or more properly *Cynips oneratus*, of my 'Catalogue.'"

The above description being altogether insufficient to distinguish this species, I will add the following :

General color yellowish or rufous, with pectus, spot on vertex, another on pronotum, more or less of the mesonotum and scutellum, the metathorax, the first abdominal segment and the dorsum of the second, the tips of the mandibles and the hind tarsi black or blackish. Antennæ 14-jointed, nearly as long as the body, third joint but slightly longer than the fourth; mesonotum coarsely transversely

wrinkled, parapsidal grooves very distinct; sides of second abdominal segment, posteriorly, densely microscopically punctate. In the male the antenna is 15-jointed and more or less infuscated, and the thorax is almost entirely black. Length from 2 to 3.5 mm.

Baron Osten Sacken says that the black on the mesonotum varies in extent, but that there is always some yellow on the sides of the mesonotum in the female. This is true of all the specimens that I have seen from the eastern part of the country, but I have seven females bred from Colorado galls that are indistinguishable from *oneratus*, except that the mesonotum is entirely black, the only rufous coloration on the thorax being a narrow strip on the collar immediately in front of the tegulæ, and the antenna is black with the joints only rufous. Five males of this Western form have the thorax entirely black in every case, while a single male from Ottawa, Canada, the only other male that I have seen, has the thorax black, except a narrow margin on the propleuræ.

Judging from Harris' description, it seems probable that his specimens came from galls of *Holcaspis globulus*, and it is from this gall that Fitch and Osten Sacken obtained their specimens. My specimens were bred from galls of *Cynips strobilana* O. S. both in Michigan and Iowa, and from galls of *Holcaspis rubens* Gill. and *Dryophanta brevipennata* Gill. taken at Manitou, Colorado, by the writer.

As these Western forms are all constant in their coloration, and are easily separated by it from Eastern specimens, I will suggest for them the varietal name *coloradensis*.

Synergus garryana Gill.

Synergus garryana Gill., Can. Ent. xxv, 1893, p. 110, ♀ ♂.

"Female.—General color rufous, with tips of mandibles, compound eyes, vertex between ocelli, occiput, lower half of the mesopleuræ, metathorax, pedicel of abdomen and two blotches on second abdominal segment, one next the petiole and one just beyond the middle of the dorsum, black. Head: face entirely yellowish rufous, coarsely striated and sparsely set with short hairs; vertex rugoso-punctate; antennæ 14-jointed, and in color like the face, a little infuscate at the tip. Thorax above a little darker rufous than the face, transversely rugose; parapsidal grooves narrow and rather indistinct, but extending to the collar, sparsely set with short recumbent hairs; scutellum coarsely rugose, the foveæ oblique and shining black at the bottom; mesothoracic pleuræ coarsely aciculate; in two specimens the lower half only is black, and in two others a little smaller, the entire pleuræ are black. Abdomen: petiole coarsely striated; second segment very smooth and shining and finely punctured on outer third. Legs, including coxæ, uniform light yellow, except the tarsi of the hind pair and the tips of the last tarsus in the others, which are black. Wings hyaline, nervures light, areolet obsolete. Length 2.5–3 mm.

"Male.—The male differs from the female as follows: Length 2½ mm.; vertex

above antennæ, except a narrow orbital line, black; antennæ 15-jointed, thorax entirely black; abdomen black, except the tip of the second segment, which is yellowish, and the entire tibiæ of the hind pair of legs, which are slightly blackish."

The above description was made from four females and five males which issued between the 1st and 10th of March from galls resembling those of *Holcaspis monticola* Gill. sent me by Mr. Trevor Kincaid, who collected them from *Quercus garryana* at Olympia, Wash.

This species is very close to *oneratus* and *ficigera*, and especially to the latter species, but I find no trouble in separating the specimens in my possession as indicated in the synopsis above.

Synergus incisus n. sp.

Female.—Colors smoky-yellow and black or blackish. Head smoky-yellow with vertex, down to mandibles, occiput and tips of mandibles black, microscopically rugulose; vertex with scattered broad punctures, eyes not margined with transverse short wrinkles between antennæ and vertex; antennæ 14-jointed, rather short, just about attaining abdomen, feebly clavate, third joint distinctly longer than fourth, terminal joint hardly once and a half the length of the preceding, color yellow. Thorax with mesonotum densely and rather coarsely transversely rugose, especially posteriorly, parapsides present but rather indistinct, scutellum coarsely rugose, foveæ nearly obsolete, color of mesonotum, scutellum and most of pleuræ black or blackish, collar more or less yellow at the sides, pleuræ entirely aciculated. Abdomen punctured on posterior one-half, black at base and on dorsum of second segment, shading into smoky-yellow posteriorly and below, the segments beyond the second largely exposed on the dorsum because of a very deep V-shaped notch in that segment, the exposed segments densely punctured, the ovipositor sheaths protruding and black in color. Legs entirely light yellow, except posterior tarsi, which are somewhat infuscated. Length 2.5 mm.

Male.—Differs from the female by having the sides of the collar and the pleuræ yellow, abdomen entirely black, second segment but little incised, antennæ 15-jointed, and by being 1.75-2.25 mm. in length.

Described from three females and ten males bred from the galls of *Andricus frequens* Gill. Collected by the writer at Manitou, Colo.

Synergus similis n. sp.

Female.—General color yellowish with antennæ, vertex above antennæ, occiput, tips of mandibles, fully half of mesonotum, pectus, pleuræ, metathorax, most of collar, dorsum of second abdominal segment, ovipositor sheaths, a line on outside of all the tibiæ, and the tarsi black or blackish. Head entirely minutely sculptured, on vertex with numerous very broad punctures back of the ocelli and with coarse wrinkles outside the ocelli running parallel with the margins of the eyes; antennæ 14-jointed, nearly as long as the body, third and fourth joints about equal, and the fifth and sixth hardly shorter, not at all clavate towards the tip, terminal joint about once and a half as long as the preceding. Thorax, with mesonotum, very finely and evenly rugoso-punctate, appearing as feeble transverse rugæ under a half inch objective, parapsidal grooves weak. The lateral

margins of the mesonotum, a line along each parapsidal groove, the entire space between the grooves posteriorly and the scutellum rufous; the rest of the mesonotum black, foveæ of the scutellum weak, mesopleuræ entirely aciculated, black. Abdomen yellow, with a shining black blotch or dorsum, densely punctured on posterior one-half of second segment; this segment somewhat incised on dorsum, exposing the following segments (in one example the third and following segments are retracted under the second and the ovipositor sheaths are left standing out away from the abdominal segments), ovipositor sheaths attaining the dorsal line. Feet light honey-yellow, except as mentioned above. Length 2.75-3.5 mm.

Described from four females bred from the galls of *Holcaspis brevipennata* Gill. from Manitou, Colo.

This species is separated from *oneratus* O. S., which it very closely resembles by the finer sculpturing of the mesonotum, and in the absence of the short, coarse wrinkles margining the eyes just above the antennæ, which are quite pronounced in that species.

Synergus duricoria n. sp.

Female.—Yellow, with tips of mandibles, a small spot on vertex, neck, pectus, dorsum of metathorax, first and second abdominal segments, ovipositor sheaths, a line on the upper side of hind tibiæ and hind tarsi, black or blackish. Head: face very sparsely and weakly pubescent, vertex and occiput very minutely rugulose and with numerous broad shallow punctures; antennæ 14-jointed, very nearly as long as the insect, third and fourth joints nearly equal, fifth and sixth hardly shorter, the terminal joint nearly equal to the two preceding, flagellum not at all clavate. Thorax very finely, evenly and densely rugose on mesonotum, parapsides weak, but plainly visible throughout: scutellum with two distinct, but rather shallow transverse foveæ. Abdomen densely punctured at sides posteriorly, second segment deeply notched on dorsum posteriorly, exposing the following segments and the ovipositor sheaths. Wings hyaline, with main veins quite black, areolet small and nearly obsolete. Length 4 mm.

Described from a single female bred from the galls of *Holcaspis duricoria* Bass. that were sent me by Mr. F. M. Jones, of Wilmington, Del.

Synergus ficigeræ Ash.

Synergus ficigeræ Ash., Trans. Am. Ent. Soc. xii, 1885, p. 301. ♀ ♂.

Synergus ficigeræ Cresson, Syn. Am. Hymen. 1887, p. 180.

Synergus ficigeræ De Dalla Torre, Cat. Hymen. 1893, p. 111.

"Length .08-.14 inch. Head and thorax reddish brown, punctate, the punctures coarser on thorax, slightly pubescent; antennæ 13-jointed in female, 15-jointed in male, yellowish; abdomen yellow, testaceous, with a large black blotch on disc; legs yellow, posterior tibiæ brown along the upper edge; wings hyaline, veins brown."

I have two of Mr. Ashmead's types in my possession, both of which are females, and both have, unmistakably, 14-jointed antennæ. The species is closely related to *oneratus*, and plainly belongs to the 14- and not to the 13-jointed group.

Mr. Ashmead's specimens were bred from the galls of *Holcaspis ficigera* Ash.

Synergus erinacei n. sp.

Female.—Thorax, abdomen, eyes, vertex, occiput and tips of mandibles black; orbits of eyes, entire antennæ and legs and tegulæ yellow, the legs being especially pale. Head minutely sculptured with broad, shallow punctures, especially abundant and distinct about the ocelli, mandibles tridentate, the terminal tooth being long and pointed; antennæ 14-jointed, and as long as the entire body, second joint rather long, third and fourth joints of about equal length, the terminal joint but little longer than the preceding. Thorax finely, transversely rugoso-punctate, but not distinctly transversely wrinkled, the parapsidal grooves are very distinct throughout their entire course, the two parallel lines from the anterior dorsal margin of the mesonotum are distinct, but short; scutellum coarsely rugose and with two small and approximate and very distinct foveæ; mesothoracic pleuræ entirely finely aciculate. Abdomen about as broad as long, rounded off (not pointed) posteriorly, the hind third microscopically punctured, ventral valve prominently projecting, the ovipositor sheaths directed upwards and slightly projecting. Legs, including the coxæ, pale yellow. Wings hyaline, veins slender and pale, areolet large and nearly obsolete. Length 3 mm. to the tip of the abdomen.

Male.—Differs from the female in being about one-half mm. shorter, in having the antennæ 15-jointed, and in having the head entirely pale yellowish, except a large black blotch on the vertex.

Described from one female bred by the writer from a gall of *Acraspis erinacei* Walsh at Ames, Ia., and from thirteen females and two males bred from galls of the same insect sent me by Mr. F. E. Moeser, of Buffalo, N. Y.

The specimens are all remarkably uniform in size and coloration.

Synergus punctata n. sp.

Female.—Black, bases of mandibles and portions of face immediately adjoining, legs, antennæ, and tegulæ yellowish. Head: vertex very minutely sculptured, moderately shining, the ocelli rufous in color, antenna 14-jointed, third joint but little longer than the fourth, last joint but little longer than the penultimate. Thorax: mesonotum finely rugose, but little shining, parapsidal grooves distinct posteriorly, but hardly traceable anteriorly, the two parallel ridges extending back from the collar are very distinct; scutellum coarsely rugose, foveæ shallow and rough at the bottom, lower portion of mesothoracic pleuræ finely aciculate with a large, smooth, triangular spot beneath the base of the wings. Abdomen black, microscopically punctured on posterior half of second segment, as broad as long, ventral valve usually protruding. Legs, including the coxæ, pale yellowish. Wings hyaline, nervures pale, areolet scarcely visible. Length 1.50–2.25 mm.

Male.—Differs from the female by having lower face and genæ yellow, antennæ 15-jointed, third joint about one and one-half times the fourth. Length 1.25–1.50 mm.

Described from twenty-four females and twenty-two males bred from galls of *Holcaspis rubens* Gill. and *Dryophanta glabra* Gill. all taken at Manitou, Colo.

Three males bred from galls resembling those of *Holcaspis monticola* Gill. and sent me by Mr. Trevor Kincaid, of Olympia, Wash., differ from the specimens bred here by having the hind tibiæ blackish in color. Five males from Ames, Ia., seem to differ only in having the sides of the abdomen somewhat less punctured.

Synergus mendax Walsh.

Synergus mendax Walsh, Proc. Ent. Soc. Phila. ii, 1864, p. 498, n. 21, ♀.

Synergus mendax O. S., Proc. Ent. Soc. Phila. iv, 1865, p. 378, n. 7, ♀.

Synergus mendax Cresson, Syn. Am. Hymen. 1887, p. 180.

Synergus mendax De Dalla Torre, Cat. Hymen. ii, p. 112.

"*Female*.—Black. Head, with the space behind the eyes (but not the occiput), and also the face below the origin of the antennæ and the mouth, dull yellowish brown varying from dark to pale, the vertex pale and moderately polished, the rest of the head opaque and moderately pubescent. Antennæ nearly as long as the body, 14-jointed with the last joint hardly longer than the penultimate, yellowish brown with the two basal joints blackish. Thorax with the collare very finely rugose, the mesonotum before the scutellum with coarser transverse waving striæ or rugosities, and with two acute longitudinal striæ converging on the scutellum, between the bases of which striæ is a shallow, but widely impressed fovea; scutellum rugose, with the two basal foveæ subobselete; under the wings is a small, but highly polished round spot. Abdomen highly polished; the joints succeeding the second concealed by it; the second joint dorsally describing an arc of 30°; ventral valve moderate, thin, brownish subhyaline, its tip unarmed and at an angle of 45°; sheaths extending a little below or above the line of the back, with the ovipositor generally protruding from between them. Legs dull pale brown or brown-black, the trochanters, the knees and the tarsi, except their tips, honey-yellow or dull rufous, each successive pair of legs a little darker than the preceding. Wings hyaline, veins rather fine, the principal ones lightly tinged with brown, the cubitus hyaline and indistinct; areolet moderate, its two basal sides hyaline; radial area about two and a half times as long as wide, distinctly closed by a brownish vein, the areolet placed scarcely more than one-fourth of the way from its basal end. Length: female .08–.10 inch.; male unknown."

Mr. Walsh's specimens were bred from the galls of *Andricus podagræ*. I have eleven specimens of this species that I bred from an unknown twig gall upon *Quercus rubra* at Lansing, Mich. Six of these are males, and may be distinguished from the females as follows: Length .06 of an inch; head (except vertex and occiput), antennæ and entire legs, light straw-yellow; thorax and abdomen deep black.

Synergus batatoides Ash.

Synergus batatoides Ash., Trans. Am. Ent. Soc. xii, 1885, p. 301, ♀ ♂.

Synergus batatoides Cresson, Syn. Am. Hymen. 1887, p. 180.

Synergus batatoides De Dalla Torre, Cat. Hym. ii, 1893, p. 109.

"Length .12–.14 inch. Head, antennæ and legs, yellowish; head punctate, with a brown blotch on vertex; antennæ short, 14-jointed in female, 15-jointed in male. Thorax and abdomen black, the latter polished, the thorax is coarsely punctate and finely pubescent. Wings hyaline, veins brown."

This species resembles *S. leviventris* quite closely, but is easily separated from that species by the larger size and the different sculpturing of the mesonotum as indicated in the synopsis of species.

Synergus atripes n. sp.

Female.—Black, with antennæ, lower face, genæ, tegulæ and portions of anterior and middle femora and tibiæ rufous or deep smoky, face above antennæ and vertex minutely rugulose and rather thickly set with broad shallow punctures, antennæ short, hardly reaching to middle of second abdominal segment, third joint nearly twice the fourth, joints 4 to 14 all subequal, not at all clavate. Thorax with mesonotum rather coarsely transversely wrinkled, parapsides rather indistinct; scutellum coarsely rugose, foveæ obliterated, mesopleuræ entirely aciculated. Abdomen black, without punctures, or with a few feeble ones near the posterior margin only, second segment produced dorsally, making it pointed and sublanceolate when viewed from the side, segments back of the second and the ovipositor sheaths entirely covered, the ventral valve slightly protruding; marginal cell of wing short and triangular, areolet small and nearly obsolete. Length 2-3 mm.

Males differ in having antennæ 15-jointed, and in being from 2-2.5 mm. long.

Described from ten females and six males bred from the galls of *Holcaspis brevipennata* Gill. that were taken at Manitou, Colo.

Synergus mexicana n. sp.

Female.—Head, except tips of mandibles and vertex, yellowish; mesonotum yellow, abdomen black, antennæ yellow, legs yellowish beneath, blackish above; metanotum densely and coarsely transversely wrinkled; scutellum coarsely and irregularly wrinkled with foveæ almost obsolete; mesopleuræ entirely striated and opaque, abdomen deep shining black without punctures on posterior half of second segment; second segment rounded off, not pointed posteriorly. The antennæ are 14-jointed, and the third joint about equals the fourth and fifth together in length.

Described from a single female sent me by Mr. T. D. A. Cockerell, of Las Cruces, New Mex.

This species comes most nearly to *S. batatoides* Ash.

Synergus coniferæ Ash.

Synergus coniferæ Ash., Trans. Am. Ent. Soc. xii. 1885, p. 301. ♀ ♂.

Synergus coniferæ Cresson. Syn. Am. Hymen. 1887, p. 180.

Synergus coniferæ De Dalla Torre, Cat. Hymen. ii, 1893, p. 110.

“Length .10 inch. Reddish brown, punctate and finely pubescent, the pubescence being quite thick on the face; antennæ 14-jointed, reaching to the base of the abdomen; thorax transversely wrinkled with parapsides distinct; abdomen at base testaceous; posterior femora and intermediate and posterior tibiæ along upper edges brown; wings hyaline, veins pale.”

The peculiar sculpturing of this species readily separates it from any other described species (see synopsis).

Synergus campanula O. S.

Synergus campanula O. S., Proc. Ent. Soc. Phila. iv, 1865, p. 376, n. 4, ♀.

Synergus campanula Cresson, Syn. Am. Hymen. 1887, p. 180.

Synergus campanula De Dalla Torre, Cat. Hymen. ii, 1893, p. 110.

"Female 0.08-0.10 long. Head black, except the face, which is brownish below the antennæ and brownish yellow above the mouth; the brownish or yellowish coloring sometimes extends above the antennæ in the shape of a narrow stripe along the eyes; vertex black, little shining, smooth. Antennæ brownish yellow, a little shorter than the body, 14-jointed (♀); the fourth joint is a little shorter than the third, the following joints gradually decreasing in length; the fourteenth is about once and a half the length of the preceding joint. Thorax deep black and but little shining, with dense, delicate rugæ, evenly spread over its upper surface, which is also clothed with a short, fine and scattered pubescence; parapsidal grooves not very deep but distinct; a vestige of an intermediate furrow, especially visible in a certain light towards the scutellum; two minute, parallel, glabrous lines, running a short distance from the middle of the collar, backwards (they are visible under a strong lens only); scutellum rather large gibbose, densely and deeply rugose; its basal foveæ rather small; pleuræ with a smooth, polished, black space, the lower part of which is finely aciculate; scapulæ yellow; first segment of the abdomen longitudinally striate; the second segment concealing all the following, has the shape of a regular oval when seen from above: seen from the side its longitudinal diameter is about equal to its transverse one; its outline is almost that of half a circle, which has a flat arc (the dorsal side of the segment) instead of a diameter; the ventral valve or the tip of the sheath of the ovipositor are sometimes, but not always, protruding beyond the hind edge of the second segment; the abdomen is polished black, sometimes brownish along the hind edge; feet brownish yellow, tips of the tarsi brown; veins of the wings pale; areolet of medium size, almost obsolete, as one side of it only (the prolongation of the second transverse vein) is short and distinct."

Baron Osten Sacken's specimens were bred from galls of *Holcaspis globulus* Fitch and similar galls, probably those of *H. duricoria* Bass. from *Quercus bicolor*.

I have a number of specimens bred from galls of *Holcaspis duricoria* Bass. sent me by Mr. F. E. Moesier, Buffalo, N. Y., and a few specimens bred from galls of *Biorrhiza forticornis* Walsh, collected by Mr. C. F. Baker at St. Croix Falls, Wis.

Synergus albipes (Walsh).

Synophrus albipes Walsh, Proc. E. S. Phila. ii, 1864, p. 479 and 496, n. 17. ♀ ♂.

Synergus albipes Cresson, Syn. Am. Hymen. 1887, p. 180.

Synergus lanæ De Dalla Torre, Cat. Hymen. ii, 1893, p. 111.

"Differs from *leviventris* O. S. only as follows: First. The entire body, including the head, with the exception of the palpi which are whitish or pale yellowish, is always black. Second. The antennæ of the female are 14-jointed (not 13-jointed), the last joint one-third longer than the preceding one. Third. The second abdominal joint always covers the terminal joints both in male and female. Fourth. The legs are whitish, scarcely tinged with yellow, with the tarsal tips brown, but otherwise immaculate in a single male, where the hind femora and

tibiæ, and in a less degree the intermediate ones are brown. Fifth. The sheaths of the ovipositor do not project beyond the line of the back, or scarcely, and in a single female only, though the ovipositor often projects from between them, which is not seen in any of my five *læviventris* females. Length of male .04-.07 inch.; female .07-.09 inch.

"Twelve males and eight females bred from the galls of *Q. floggi* (equals *Q. lana*? Fitch) on the 4th of August, when I obtained 41 males, 5 females, and other specimens August 1st and after August 4th, all from galls of the preceding year's growth. Hence it would seem that this species is not double brooded like *læviventris*."

Mr. Cresson, in his "Synopsis of the Hymenoptera," etc., published in 1887, make this species synonymous with *lanæ* Fitch, which I think is a mistake. In *lanæ* the head, except the vertex, is straw-colored, while in *albipes* it is all black; in *lanæ* the second abdominal segment does not completely cover the succeeding, while in *albipes* it does; in *lanæ* the females are 15-jointed, while in *albipes* they are but 14-jointed. I have both species in my collection, and they are very distinct.

As the name *albipes* was preoccupied for an European species by Hartig, I will suggest for Walsh's species the name *walshii*. My specimens were bred from galls taken at Lansing, Mich., but what galls I do not know.

Synergus læviventris O. S.

Synophrus læviventris O. S., Proc. Ent. Soc. Phila. i, 1861, p. 57, ♀ ♂.

Synophrus læviventris Walsh, Proc. Ent. Soc. Phila. ii, 1864, p. 494, n. 16, ♀ ♂.

Synergus læviventris O. S., Proc. Ent. Soc. Phila. iv, 1865, p. 375, n. 3.

Synergus læviventris O. S., Proc. Ent. Soc. Phila. v, 1867, p. 380.

Synergus læviventris Cresson, Syn. Am. Hymen. 1887, p. 180.

Synergus læviventris De Dalla Torre, Cat. Hymen. ii, 1893, p. 111.

"Female 0.07-0.08 long. Head reddish brown, vertex darker, antennæ brownish yellow, second joint not much shorter than the fourth, the third about one-third longer than the fourth; joints four, five and six of about equal length; the fourteenth, or last joint, is somewhat less than once and a half the preceding; thorax black and moderately glossy, finely rugoso-punctate and pubescent; scutellum gibbose with a slight, sharp, recurved, elevated margin (thorax and scutellum in older specimens often becoming brownish or reddish brown); parapsidal grooves distinct their whole length; foveæ at the base of the scutellum rather small, but distinct; pleuræ black or brownish, polished and glossy under the root of the wing, aciculate below, punctate anteriorly; first abdominal segment striate; the second segment, covering all the following, is chestnut-brown or black, paler on the under side: its shape, seen from above, is elongated-ovoid, the tip being drawn out in a point: the side view is almost lanceolate, the top appearing pointed; held against the light, the valves of the ovipositor, as well as the ventral valve, may be seen, concealed as they are under their unusually long second joint; the ovipositor, alone, protrudes sometimes beyond the joint; feet brown-

ish yellow, extreme tip of tarsi more or less brownish (one of my specimens has the hind tibiæ and tarsi somewhat infuscated); wings hyaline, veins pale; areolet almost obsolete, as one side of it only (which is the prolongation of the second transverse vein) is stout and distinct; the two other sides, as well as the whole course of the cubital vein, are almost obsolete."

This species was bred by both Walsh and Osten Sacken from the galls of *Amphibolips spongifica* O. S., and Osten Sacken also bred it from *Holcaspis centricola* O. S. I have quite a number of specimens in my collection that I bred from *Holcaspis globulus* Fitch in Michigan and from *Holcaspis rubens* Gill. collected at Manitou this State.

Group III (Antennæ of Females 15-jointed).

Only three species have been described in this group, and they may be separated as follows:

A. Thorax coarsely transversely wrinkled.....**magnus** Gill.

AA. Thorax finely sculptured, not distinctly transversely wrinkled.

B. Abdomen blackish throughout; small species, not exceeding 2.5 mm.

lanæ Fitch.

BB. Abdomen largely yellow; large species, exceeding 2.5 mm. . **villosus** Gill.

Synergus magnus Gill.

Synergus magnus Gill., Bull. Ill. Lab. Nat. Hist. iii, 1890, p. 202, ♀.

Synergus magnus De Dalla Torre, Cat. Hymen. ii, 1893, p. 112.

"Head rufous yellow, vertex and thorax entirely black, abdomen rufous yellow, except a narrow black stripe along the tergum of the second segment, feet light yellow, except the tibiæ and tarsi of the hind pair, which are infuscate. Length 4 mm.

"Head: face coarsely striate, vertex and occiput microscopically rugulose and with broad punctures; antennæ black, as long as the insect, 15-jointed, third joint but little longer than the fourth. Thorax with coarse, transverse wrinkles, parapsides distinct throughout, median groove reaching the posterior ends of the parallel lines; the lateral grooves appear more like ridges, and are short and oblique; shoulders coarsely wrinkled, pleuræ very coarsely aciculated below and very finely aciculated above, with a smooth, shining spot midway upon the most prominent part; scutellum with two small foveæ and coarsely rugose. Abdomen: first segment, as well as the petiole of the metathorax, coarsely wrinkled or fluted, second segment occupying nearly the whole surface of the abdomen, ovipositor sheaths long and projecting upward above the line of the tergum, venter considerably projecting. Wings long, narrow and slightly smoky, areolet medium."

The above description was made from a single female bred from the galls of *Amphibolips cookii* Gill. gathered at Lansing, Mich.

Synergus lanæ (Fitch).

Cynips quercus lanæ Fitch, Fifth Rep. Ins. N. Y. 1859, p. 814, n. 316.

Cynips quercus lanæ O. S., Proc. Ent. Soc. Phila. i, 1861, p. 62, n. 10.

Cynips quercus lanæ O. S., Stettin. Ent. Zeitg. xxii, 1861, p. 409, n. 9.

Cynips quercus lana O. S., Proc. Ent. Soc. Phila. iv, 1865, p. 359, n. 45.

Andricus lana Ashmead. Trans. Am. Ent. Soc. xii, 1885, p. 295.

Synergus lana Cresson, Synop. Am. Hymen. 1887, p. 180.

Synergus lanæ De Dalla Torre, Cat. Hymen. ii, 1893, p. 111.

Fitch's very brief description of this species is as follows :

"Small black flies with white or straw-colored heads, antennæ and legs, and with shining smoky yellow abdomens, having a black or blackish cloud occupying their back and sides, the females with 15-jointed antennæ, and their length 0.09."

I have two apparently typical specimens of this species which I bred from the galls of *Andricus flocci* at Ames, Iowa.

To Fitch's description I will add the following :

The only black on the head is on the vertex and the tips of the mandibles; the only light coloration upon the thorax is along the parapsidal grooves themselves, which are rufous; the mesonotum is moderately shining and very finely and evenly sculptured; the foveæ of the scutellum are rather large and shining; the abdomen is black, shading into smoky brown posteriorly and beneath, and is as broad as long and rounded off posteriorly, not prolonged in a point; the second segment not quite covering the third and fourth, the second segment without punctures, the ovipositor sheaths and ventral valve prominently exposed.

Synergus villosus Gill.

Synergus villosus Gillette, Bull. Ill. Lab. Nat. Hist. iii, 1890, p. 202, ♀.

Synergus villosus De Dalla Torre, Cat. Hymen. ii, 1893, p. 114.

"The front, above the insertion of the antennæ, the vertex, a broad stripe extending over the occiput to the collar, the entire thorax, a broad blotch on the second abdominal segment extending far down at the sides, the tips of the mandibles, and a spot upon the tergum of the fifth abdominal segment black; feet, including the coxæ, light yellow, orbits and antennæ slightly rufous, other parts light yellow. Head: face rather finely striate, vertex and occiput with numerous coarse punctures on a microscopically sculptured surface, antennæ 15-jointed, nearly as long as the body. Thorax: mesonotum with fine transverse ridges, the furrows between bearing coarse, but shallow and somewhat confluent punctures, parapsidal grooves very distinct, median groove narrow and extending but a short distance, parallel lines and lateral furrows not very distinct, pleuræ coarsely aciculated below, finely above and with a smooth median spot; scutellum bifoveate, rather coarsely sculptured, foveæ shallow, the sculpturing somewhat obscured by pubescence. Abdomen: first joint, as well as petiole of metathorax, fluted, second segment occupying nearly the entire surface of the abdomen, venter rather prominent. Wings hyaline, areolet rather indistinct.

"Described from two specimens (♀) bred from the galls of *Acraspis villosus* Gill. taken in Iowa."